

## Trends and predictors of 30 day readmissions following percutaneous nephrolithotomy in kidney stones formers and implications for readmissions-based quality metrics

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**Introduction & Objectives:** The use of hospital-readmission rates as a hospital quality metric has been debated as hospitals' post-surgical readmission rates may be more due to patient factors (case mix) compared to hospital factors. It is not known whether a similar trend is present in advanced endoscopic procedures. We therefore sought to evaluate the contribution of individual hospitals on the patient-level probability of readmission after a typical high-risk endoscopic procedure, percutaneous nephrolithotomy (PCNL).

**Materials & Methods:** Using the Nationwide Readmission Database, we identified non-elective 30-day readmissions following PCNL in U.S. hospitals in 2014. Using a multilevel mixed effects model, we estimated the influence of hospital and clinical variables on patients' odds of readmission. A hospital-level random effects term was used to estimate the contribution of unmeasured hospital characteristics on their patients' probability of readmission. In order to assess the relative contribution of each group on the predicted probability readmissions, a pseudo R-squared was calculated for predictor variables.

**Results:** For a weighted sample of 6,974 patients who received PCNL at 485 hospitals, the 30-day readmission rate was 8.5% (95% CI 7.4 – 9.7). In our adjusted model, hospital characteristics such as surgical volume were not associated with increased likelihood of readmission. Individual hospitals contributed marginally to their patients' probability of readmission. Patient-level characteristics explained far more of the variability in readmissions than hospital characteristics (R squared 0.53963 vs 0.00305).

Table 2: Predictors of 30-Day Readmission in Kidney Stones Formers Undergoing Percutaneous Nephrolithotomy Based of Multilevel Model Incorporating Hospital-level Random Effects		
	Odds Ratio	95% Confidence Interval
<b>Patient Characteristics</b>		
<b>Age</b>	1.01	0.99-1.03
<b>Sex</b>		
Male	<i>Ref</i>	
Female	0.67	0.46 – 0.98
<b>Charlson Comorbidity Index</b>		
1	<i>Ref</i>	
2	1.14	0.72 – 1.81
3	1.76	1.01 – 3.05
4	1.83	0.86 – 3.90
≥5	0.64	0.15 – 2.79
<b>Insurance/Payor</b>		
Private	<i>Ref</i>	
Medicare	1.20	0.70 – 2.08
Medicaid/Other Gov't	1.18	0.62 – 2.29
None/Self Pay	0.61	0.14 – 2.74
Other/Unknown	2.11	0.65 – 6.85
<b>Income Quartile**</b>		
1 <sup>st</sup>	<i>Ref</i>	
2 <sup>nd</sup>	1.02	0.41 – 2.54
3 <sup>rd</sup>	1.33	0.68 – 2.61
4 <sup>th</sup>	1.22	0.58 – 2.28
<b>Hospital Characteristics</b>		
<b>Hospital Owner</b>		
Government	<i>Ref</i>	
Private, non-profit	0.98	0.59 – 1.69
Private, investment	0.78	0.34 – 1.78
<b>Bed Size</b>		
Small	<i>Ref</i>	
Medium	1.20	0.51 – 2.85
Large	0.88	0.38 – 2.03
<b>Hospital Surgical Volume (Quartiles)</b>		
1 <sup>st</sup>	<i>Ref</i>	
2 <sup>nd</sup>	1.30	0.87 – 1.91
3 <sup>rd</sup>	1.09	0.73 – 1.63
4 <sup>th</sup>	0.95	0.61 – 1.46
<b>Index Hospitalization</b>		
<b>Length of Stay</b>	1.00	0.98 – 1.02
<b>Index Hospitalization Cost</b>	1.00	1.00 – 1.00
<b>Month of Index Hospitalization</b>		
January	<i>Ref</i>	
February	1.17	0.40 – 3.42
March	1.77	0.66 – 4.74
April	1.23	0.45 – 3.40
May	2.13	0.83 – 5.50
June	1.62	0.60 – 4.40
July	1.32	0.48 – 3.66
August	1.15	0.42 – 3.11
September	1.82	0.68 – 4.87
October	1.70	0.63 – 4.58
November	1.68	0.63 – 4.51

**Conclusions:** Compared to patient-level characteristics, hospital characteristics contributed minimally to a model predicting patient-level probability of readmission. These findings underscore the potential limitations of 30-day post-discharge readmissions to evaluate hospital quality of care.